ANNUAL REPORT

OF

THE HOWE LABORATORY OF OPHTHALMOLOGY

HARVARD MEDICAL SCHOOL

1952

243 CHARLES STREET

BOSTON, MASSACHUSETTS

STAFF

David G. Cogan, M.D.: *Associate Professor of Ophthalmic Research — Director*

W. Morton Grant, M.D.: *Assistant Professor of Ophthalmic Research*

David D. Donaldson, M.D.: *Instructor in Ophthalmic Research*

Jin H. Kinoshita, Ph.D.: *Instructor in Biochemistry*

Robert R. Trotter, M.D.: *Instructor in Ophthalmic Research*

Toichiro Kuwabara, M.D.: *Assistant in Ophthalmic Research*

Harold L. Kern, B.S.: *Assistant in Ophthalmic Research*

THE past year saw a conservative expansion in activities at the Howe Laboratory. Several new investigators joined the staff, some additional laboratory space was acquired, and the scope of activities expanded slightly. There was, however, a predominant continuity of research with that of previous years and the following is essentially a progress report submitted to those who, it is hoped, have some interest in the affairs of the Laboratory.

Research

The fundamental discovery of a means to measure the facility of outflow of the aqueous humor has brought forth further practical results. The application of this method has proved of major importance not only in the detection of early glaucoma and in the defining of different types of glaucoma, but also it has led logically to improvements in the treatment of glaucoma. It is perhaps not exceeding the bounds of humility to state that this study of tonography and gonioscopy, which has been jointly pursued at the Howe Laboratory by Drs. Grant and Paul A. Chandler, has resulted in one of the most important contributions to ophthalmology in the past decade. Recently Dr. Trotter has joined the staff to explore further some of the practical applications of tonography and financial assistance has been obtained from the United States Public Health Service.

The investigation of radiation effects on the eye, supported by the Atomic Energy Commission, has continued to occupy a prominent position in the activities of the Laboratory. Through facilities at the Los Alamos Scientific Laboratories it has been possible for us to irradiate rabbits with neutrons in a manner as nearly as possible similar to that which we previously employed with x-rays. By subsequent study of the development of cataracts, a biologic equivalence has been established for the production of cataracts by x-rays and by neutrons. Both forms of energy induce tissue damage presumably through ionization, but it is now possible to state that for equivalent ionization the neutrons are approximately ten times as cataractogenic as are x-rays. Such information is of importance in establishing tolerable levels of radiation and in understanding the pathogenesis of radiation effect on the eye.

The susceptibility of the human lens to x-ray has been

determined by studying a group of approximately 60 persons who had received a known amount of radiation through the eye one or more years previously. It is believed that this is the first series involving a substantial number of patients which has been observed since accurate x-ray dosimetry was introduced two decades ago. It now appears that no lens opacities occur with x-irradiation of less than 600 roentgens; that stationary posterior polar opacities occur with exposure of 800–1000 roentgens; and progressive opacification of the lens leading to mature cataracts occurs with irradiation in excess of 2000 roentgens.

Biochemical research has played a conspicuous role in the Laboratory's affairs over the past 12 years. During the past year Dr. Jin Kinoshita joined the staff holding a joint appointment in the Howe Laboratory and Department of Biochemistry of the Harvard Medical School. Dr. Kinoshita, who has had special experience and training in protein metabolism, is currently directing his efforts toward elucidating some of the basic biochemical processes in the cornea and lens. Such studies are essential groundwork for an adequate understanding of the normal and abnormal operations of the eye.

The perennial study of the effects of toxic substances in the eye, and their treatment, has received new impetus with the discovery by Dr. Grant that certain calcific deposits in the cornea, notably those of band keratitis and of lime burns, may be successfully removed by the chelating agent, ethylenediamine tetra acetate. To determine whether some comparable manner of treatment might be applicable to other chemical injuries to the eye, a project has been undertaken in conjunction with Mr. Harold Kern correlating the nature of the ocular lesions produced under various physical and chemical conditions.

Another investigation being pursued currently in the Howe Laboratory pertains to fat accumulation in the cornea. Since this is one of the major causes of corneal opacification, an understanding of its pathogenesis and treatment might be expected to have far-reaching importance. Accordingly, Drs. Cogan and Kuwabara have embarked on an extensive program correlating experimental and clinical observations on fat metabolism in the cornea. This study is being supported in part by the Boston Eye Bank.

The foregoing projects have been picked for reference, as they stand out prominently at the moment; but listing them fails to give an adequate idea of the operations of the Laboratory. It is true that these projects, along with several others that might as readily have been selected, form the continuum to which energies are recurrently directed but in actual practice the routine of teaching, consulting, and casual exploring occupy properly an even more conspicuous place on the Laboratory's agenda. While less amenable to categorical enumeration, these latter activities are equally important in the integration of the basic and clinical sciences to which the Laboratory is dedicated.

Organization and Finance

By most standards, the Howe Laboratory is small. Its fixed income is of the order of $32,000 only. It does not aspire to be large lest the degree of organization involved would jeopardize the free and informal research which is its purpose to support. But the Howe Laboratory does not wish to be small, either; that is, so small that it cannot fulfill its purpose of coordinating the sciences in ophthalmology. It wants to have sufficient resource to compete for able and diversified talent and to support this talent with dignity and efficiency. Obviously the optimum is considerably in excess of $32,000 annually.

We have come to depend increasingly on outside aid. Government agencies especially have made major contributions to our operations. For this we are most grateful and trust that the satisfaction is mutual. But it is no secret that the type of project support to which most impersonal organizations are necessarily committed, is suitable for applied research rather than for exploratory experimentation. The necessity of meeting deadlines, the urgency of starting the project at a pre-set time and terminating it according to schedule, the hiring of first-class personnel for impractically short periods, the prolonged uncertainty between the filing and confirmation of a proposal, these and other requirements all too familiar to contract investigators may be compatible with developmental programs, but scarcely with a free investigation into the unknown.

Important as this project support is in obtaining answers to specific questions, it has not provided the facilities for the development of career investigators nor for the adequate pursuit of unanticipated leads which continually arise. For this we still depend on our deflated income and on various donations. Happily, we have had in the past few years a group of benefactors, mostly physicians, who have made possible a fund that, being unrestricted, has had a practical value out of proportion to its actual equity. This fund, together with the assistance of several organizations, has made possible the maintenance of the Laboratory at the present level with a continuity of research productiveness.

Nevertheless, the financial structure of the Laboratory can scarcely be said to be sound. It is our persistent hope that sometime, somehow, the endowment may be increased so that the Laboratory may expand to what most of us think would be an optimum size, having a firm income of approximately three times its present amount. In the meantime we shall attempt to maintain a high yield for the support which is presently available and to make the Howe Laboratory a sound investment for future benefactors of mankind.

To the following we are most grateful for their direct and indirect contributions during the past year.

For general expenses:

The Massachusetts Eye and Ear Infirmary
American Optical Company
Lions Club of Portsmouth, New Hampshire
Anonymous
Harry E. Braconier, M.D.
Paul A. Chandler, M.D.
Julian F. Chisholm, Jr., M.D.
Samuel T. Clarke, M.D.
William F. Donoghue, M.D.
Edwin B. Dunphy, M.D.
Charles Dyson, M.D.
Mr. A. J. Harris
Brendan D. Leahey, M.D.
Joseph Lo-Presti, M.D.
Abraham Pollen, M.D.
Mr. Clarence H. Porter
Marvin Posner, M.D.
Frank Trebilcock, M.D. (in memoriam)

For studies on tonography and toxicology of the eye:

Public Health Service

For studies on radiation cataracts:

Atomic Energy Commission

For studies on intraocular fluids:

The Snyder Foundation

For studies on fat metabolism in the cornea:

Boston Eye Bank

For studies on retinitis pigmentosa:

Mr. Chandler Hovey

David G. Cogan, M.D.
Director

COGAN, D. G.

with Donaldson, D.D. and Reese, A.B. Clinical and pathological characteristics of radiation cataract. Arch. Ophth. 47: 55–70, January 1952.

with Ginsberg, J. Representation of corneal and conjunctival sensation in the central nervous system. Arch. Ophth. 47: 273–275, March 1952.

Editorial: Inter-group research. Arch. Ophth. 47: 415, April 1952.

with Goff, J. L. and Graves, E. Experimental radiation cataract: II. Cataract in the rabbit following single exposure to fast neutrons. Arch. Ophth. 47: 584–592, May 1952.

with Giller, H. Papilledema as the outstanding sign in meningeal hydrops. Arch. Ophth. 48: 557–566, November 1952.

GRANT, W. M.

Chemical burns of the eye: emergency treatment. Medical Clinics of North America 36: 1215–1222, Sept. 1952.

Biochemistry, pharmacology and toxicology of the eye. Part one, Section I, Chapter 2 in *Progress in Ophthalmology and Otolaryngology* edited by Meyer Wiener and A. Edward Maumenee. New York, Grune & Stratton, 1952. pp. 8–13.

New treatment for calcific corneal opacities. Arch. Ophth. 48: 681–685, December 1952.

An iodine-vapor applicator for treatment of dendritic keratitis. Arch. Ophth. 48: 749–751, December 1952.

COGAN, D. G.

with Donaldson, D.D. and Reese, A.B. The pathogenesis of radiation cataract. Presented by Dr. Cogan at the Third Conference of the Committee on Radiation Cataracts, National Research Council, in Washington, D. C., January 28, 1952.

Ocular motor apraxia and pseudo-ophthalmoplegia. Colorado Ophthalmological Society, in Denver, Colorado and Detroit Ophthalmological Society, in Detroit, Michigan, March 1952.

Flutter-like oscillations of the eye and ocular dysmetria. New England Ophthalmological Society, in Boston, Massachusetts, April 15, 1952.

Retinal vascular disease. Postgraduate Course in Cardiology, Massachusetts General Hospital, in Boston, Massachusetts, May 20, 1952.

Eyeground changes in various medical conditions. Postgraduate Course in Internal Medicine, Massachusetts General Hospital, in Boston, Massachusetts, July 22, 1952.

A type of congenital ocular motor apraxia presenting jerky head movements. Jackson Memorial Lecture. American Academy of Ophthalmology and Otolaryngology, in Chicago, Illinois, October 12, 1952.

House Officer Lectures.

Radiation. April 24, 1952.
Ocular complications of internal disease. September 5, 1952.
Apraxia. October 1, 1952.

GRANT, W. M.

with Chandler, P. A. and Dunphy, E. B. Symposium: Differential diagnosis and management of narrow-angle glaucoma. Massachusetts Eye and Ear Infirmary House Officers' Meeting, in Boston, Massachusetts, January 24, 1952.

Low tension glaucoma. New England Ophthalmological Society, in Boston, Massachusetts, April 15, 1952.

The diagnosis of glaucoma. Medico-Military Symposium, United States Naval Hospital, in Chelsea, Massachusetts, October 28, 1952.

Gonioscopic findings in glaucoma. New England Ophthalmological Society, in Boston, Massachusetts, November 19, 1952.

TROTTER, R. R.

Practical aids to ophthalmic technique; tonography. New England Ophthalmological Society, in Boston, Massachusetts, December 17, 1952.